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Instruments for Reaching Climate Objectives

- Focusing on the Time Aspects of Bioenergy and Allocation Rules in the European Union's Emissions Trading System

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Akademisk avhandling för filosofie doktorsexamen i naturgeografi, som med tillstånd från Naturvetenskapliga fakulteten kommer att offentligt försvaras fredag den 21 oktober 2011 kl. 14.30 i Hörsalen, Institutionen för geovetenskaper, Guldhedsgatan 5C, Göteborg.

ISBN: 978-91-628-8368-3

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Abstract

The Europeans Union's (EU's) climate and energy strategy aims at reducing the emissions of greenhouse gases (GHG) by 20 % (compared to 1990) and to increase the share of renewable energy to 20 % by the year 2020. Increased use of bioenergy is considered key in these efforts. Moreover, the EU regards the Emission Trading System (ETS) to be the main policy instrument for reaching these objectives. This thesis investigates the effectiveness of these instruments for reaching climate policy objectives in the EU. Focus lies on the climate impacts from bioenergy due to how they affect atmospheric carbon dioxide (CO_2) over time; the climate impacts of peat; and how allocation rules in the EU ETS should be designed to reduce emissions in a cost effective way. The analysis shows that there is a climate impact from using forest residues for energy which depends on how fast the CO_2 emission pulse is compensated by uptake of atmospheric CO_2 (or avoided emissions in the reference case). Assuming all other factors equal, biofuels with slow uptake rates have a stronger climate impact than biofuels with fast uptake rates. The time perspective over which the analysis is done is crucial for the assessment. Over a 100 year perspective the use of branches and tops are better for climate mitigation than stumps which in turn are better than coal. Over a 20 year time perspective this conclusion holds, but the relative differences between these fuels are smaller. The climate impacts from using peat for energy can vary considerably depending on the characteristics of the peatland in question, the choice of after-treatment strategy and assumptions regarding after-treatment parameters. Over 300 years, we estimate the climate impacts from peat to range from being lower than the impacts of natural gas to higher than those of coal. In phases I and II of the EU ETS emission allowances have to a large extent been allocated free of charge to firms based on historic emissions, so called grandfathering. As production levels change, old installations are closed and new installations opened, Member States wish to limit the entitlement to allowances and update the allocation. However, the analysis shows that adjusting the initial allocation may affect firms' behaviour and significantly reduce their incentives to become more CO_2 efficient. Benchmarking (allocation based on production and sector common benchmarks or a prescribed cap) may offer a way to move from grandfathering in phase I and II of the EU ETS toward the long term goal of auctioning. Benchmarking preserves firms' incentives to become more CO_2 efficient, but involves a production subsidy. Climate efficient use of bioenergy and peat should be incentivized, taking into consideration effects on carbon stocks, while also considering other ecosystem services. This could for instance be accomplished by establishing a credit system for land-use related CO_2 reductions, which could be linked to the EU ETS.

Key words: Climate Policy, Climate Impacts, European Union, Bioenergy, Forest residues, Carbon Dioxide, Radiative Forcing, Peat, EU ETS, Emissions Trading, Allocation, Incentives, Benchmarking.